

## Unit 5 – Classifying chemical compounds (Ch. 8 & 9)

### Chapter 8.1 – Acids and Bases

- \_\_\_\_\_ compounds contain a high percentage of \_\_\_\_\_ by mass; compounds that have a low percentage of carbon are considered \_\_\_\_\_ compounds.
- Organic compounds typically form \_\_\_\_\_ bonds and contain two \_\_\_\_\_. Inorganic compounds typically form \_\_\_\_\_ bonds and contain a \_\_\_\_\_ and a \_\_\_\_\_.
- Classify each of the following compounds as organic or inorganic.
  - $\text{CaSO}_4$
  - $\text{CH}_4$
  - $\text{CH}_3\text{CH}_2\text{OH}$
  - $\text{CO}_2$
- Acids are chemical compounds that produce more \_\_\_\_\_ than \_\_\_\_\_ and bases are chemical compounds that produce more \_\_\_\_\_ than \_\_\_\_\_.
- Neutral compounds have an equal amount of  $\text{H}^+$  and  $\text{OH}^-$ , and are neither \_\_\_\_\_ nor \_\_\_\_\_.
- Generally, the chemical formula for an acid starts with a(n) \_\_\_\_\_ and the chemical formula for a base ends with a(n) \_\_\_\_\_.
- Acids generally taste \_\_\_\_\_ and bases generally taste \_\_\_\_\_.
- A salt releases a \_\_\_\_\_ ion and a \_\_\_\_\_ ion that are not  $\text{H}^+$  or  $\text{OH}^-$ .
- The chemical formula for common salt is \_\_\_\_\_.

10. Give the approximate pH value of the following substances:

Eggs	pH = _____
Oven cleaner	pH = _____
Soap	pH = _____
Stomach acid	pH = _____

11. On the pH scale, one unit of change represents a \_\_\_\_\_ times change in the degree of acidity or basicity.

12. A lemon that has a pH of 2 is \_\_\_\_\_ times more acidic than a tomato that has a pH of 4.

13. pH indicators are chemicals that \_\_\_\_\_ depending on the pH of the solution they're in.

14. Litmus paper can be used to determine if a solution is \_\_\_\_\_ or \_\_\_\_\_.

15. When blue litmus paper is placed in an acidic solution it turns the blue litmus paper \_\_\_\_\_.

16. When red litmus paper is placed in a basic solution it turns the red litmus paper \_\_\_\_\_.

17. How can you use red and blue litmus paper to tell if a solution is neutral?

18. What colour is methyl red at the following pH levels?

- At pH 4 methyl red is \_\_\_\_\_
- At pH 6 methyl red is \_\_\_\_\_
- At pH 8 methyl red is \_\_\_\_\_

19. What colour is phenolphthalein at the following pH levels?

- At pH 4 phenolphthalein is \_\_\_\_\_
- At pH 6 phenolphthalein is \_\_\_\_\_
- At pH 8 phenolphthalein is \_\_\_\_\_

20. Write the name of the acid in the blank space beside each chemical formula.

- HBr \_\_\_\_\_
- $\text{H}_2\text{CO}_3$  \_\_\_\_\_
- $\text{H}_2\text{S}$  \_\_\_\_\_
- $\text{HNO}_3$  \_\_\_\_\_
- $\text{CH}_3\text{COOH}$  \_\_\_\_\_

21. Write the chemical formula of each acid in the blank space beside each name.

- Hydrochloric acid \_\_\_\_\_
- Sulfurous acid \_\_\_\_\_
- Hydroiodic acid \_\_\_\_\_
- Perchloric acid \_\_\_\_\_

22. Solutions with a \_\_\_\_\_ concentration of hydrogen ions have a \_\_\_\_\_ pH, while solutions with a high concentration of \_\_\_\_\_ ions have a \_\_\_\_\_ pH.

### **Chapter 8.2 – Acids and Bases**

1. Lewis diagrams are similar to Bohr diagrams but they only show \_\_\_\_\_ electrons and the chemical \_\_\_\_\_.
2. How do you draw electrons in Lewis diagrams?
3. Draw the Lewis diagram for chlorine.
4. For covalent compounds, Lewis diagrams utilize \_\_\_\_\_ to represent a pair of electrons shared by atoms.
5. Draw the Lewis diagram for water ( $\text{H}_2\text{O}$ ).
6. For positive ions in a Lewis diagram, one electron dot is \_\_\_\_\_ from the valence shell for each \_\_\_\_\_ of the ion. For negative ions in a Lewis diagram one electron is \_\_\_\_\_ to each valence shell for each \_\_\_\_\_ of the ion.

7. Draw the Lewis diagram for sodium chloride (NaCl). Note: NaCl is made up of one sodium ion with a 1+ charge and one chlorine ion with a 1- charge.

### **Chapter 8.3 – Acids and Bases**

1. Both \_\_\_\_\_ and \_\_\_\_\_ are present in all organic compounds.
2. Organic chemistry is the study of compounds containing \_\_\_\_\_ carbon \_\_\_\_\_.
3. An estimated \_\_\_\_\_ new organic compounds are synthesized in research laboratories each year!
4. Carbon has the ability to form \_\_\_\_\_ bonds with other atoms and with other carbon atoms! This ability is because carbon has \_\_\_\_\_ valence electrons. Each valence electron can \_\_\_\_\_ with another single electron from another atom.
5. Carbon forms \_\_\_\_\_ bonds, oxygen forms \_\_\_\_\_ bonds and hydrogen atoms form \_\_\_\_\_ bond when together in a compound.
6. Draw a Lewis diagram for methanol.
7. A hydrocarbon is a special type of organic compound. This organic compound contains only the elements \_\_\_\_\_ and \_\_\_\_\_.
8. Draw a Lewis diagram for propane.
9. \_\_\_\_\_ produce many organic compounds, such as \_\_\_\_\_ and \_\_\_\_\_.
10. Organic compounds that are found deep with the Earth are \_\_\_\_\_ and \_\_\_\_\_ deposits.

## Chapter 9.1 – Describing Chemical Reactions

1. \_\_\_\_\_ involves the conversion of reactants into \_\_\_\_\_ with different properties than the reactants. One or more chemical changes that occur at the same time is called a \_\_\_\_\_.
2. \_\_\_\_\_ use chemical formulas to describe the chemicals that react (called the \_\_\_\_\_) and those that are produced (called the \_\_\_\_\_).
3. Chemical equations contain \_\_\_\_\_ to represent the ratios between the various compounds in a chemical reaction. An \_\_\_\_\_ represents the words or idea “changes into.”
4. Explain the conservation of mass in chemical change.

## Chapter 9.2 – Writing and Balancing Chemical Equations

1. When writing and balancing chemical equations you can first create a \_\_\_\_\_ equation, which simply shows the chemical formulas of the \_\_\_\_\_ and \_\_\_\_\_. It does not show the correct \_\_\_\_\_ in which the reactants will actually combine and the products will actually be produced.
2. A balanced chemical equation shows the \_\_\_\_\_ of each pure substance involved as well as the \_\_\_\_\_ of atoms of each element on both sides of a chemical equation.
3. In the balanced chemical equation  $2\text{H}_2(\text{g}) + \text{O}_2(\text{g}) \rightarrow 2\text{H}_2\text{O}(\text{aq})$ , \_\_\_\_\_ molecules of hydrogen gas ( $\text{H}_2$ ) react with \_\_\_\_\_ molecule of oxygen ( $\text{O}_2$ ) to produce \_\_\_\_\_ molecules of water ( $\text{H}_2\text{O}$ ).
4. When you translate a word equation into a skeleton equation we use the chemical \_\_\_\_\_ for nearly all elements that are not in a compound. For example, iron would be \_\_\_\_\_ in the skeleton equation.
5. Some important compounds you should remember the chemical formula are \_\_\_\_\_ for methane \_\_\_\_\_ for ammonia, and \_\_\_\_\_ for water.
6. Write the skeleton equation for the following word equations:
  - a. iron + sodium chloride  $\rightarrow$  iron(II) chloride + sodium

b. methane + oxygen → carbon dioxide + water

c. phosphorus tribromide + bromine → phosphorus pentabromide

d. calcium nitrate + potassium carbonate → potassium nitrite + calcium carbonate

7. Balance each of the following skeleton equations.

a.  $\text{HCl} \rightarrow \text{H}_2 + \text{Cl}_2$

b.  $\text{C}_2\text{H}_2 + \text{O}_2 \rightarrow \text{CO}_2 + \text{H}_2\text{O}$

c.  $\text{H}_2\text{SO}_4 + \text{Ca}(\text{OH})_2 \rightarrow \text{CaSO}_4 + \text{H}_2\text{O}$

d.  $\text{SrCl}_2 + \text{NaNO}_3 \rightarrow \text{Sr}(\text{NO}_3)_2 + \text{NaCl}$

e.  $\text{Cl}_2 + \text{FeBr}_3 \rightarrow \text{FeCl}_3 + \text{Br}_2$

### ***Vocabulary to Know***

Write a concise definition of each of these terms found in this chapter.

**Acid -**

**Balanced equation -**

**Base -**

**Chemical reaction -**

**Hydrocarbons -**

**Inorganic compound -**

**Law of Conservation of Mass -**

**Organic compound -**

**pH scale -**

**Products -**

**Reactants -**

**Skeleton equation -**